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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,302	04/08/2004	Hilde Grude Borgos	60.1531	7440

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SCHLUMBERGER-DOLL RESEARCH  
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RIDGEFIELD, CT 06877-4108

EXAMINER

HUGHES, SCOTT A

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 08/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/820,302

Applicant(s)

BORGOS ET AL.

Examiner

Scott A. Hughes

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>4/15/2005</u> .   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the limitation "within each class" in the last line of the claim.

There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 13-15, and 18-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Sonneland.

With regards to claim 1, 20, and 21, Sonneland discloses a method of processing and interpreting seismic data. Sonneland discloses a computer system and a computer product that have means for carrying out the method. Sonneland discloses identifying a plurality of extrema positions associated with the seismic data, deriving coefficients that

characterize the seismic data waveform in the vicinity of the extrema positions, and forming groups of the extrema positions where the coefficients are similar (Figs. 4-5) (Column 5, Line 46 to Column 6, Line 8; Column 1; Columns 3-4).

With regard to claim 2, Sonneland discloses that he extrema positions are identified with sub-sample precision (Column 4, Lines 20-33).

With regard to claim 3, Sonneland discloses that the coefficients are derivatives (Column 1, Lines 25-57).

With regard to claim 4, Sonneland discloses that the derivatives are determined using orthogonal polynomials and the derivatives allow local reconstructions of seismic traces in the vicinity of the extrema positions to be obtained using Taylor series expansions (Columns 1, 3-4).

With regard to claim 5, Sonneland discloses that the seismic data is subjected to orthogonal polynomial spectral decomposition and the extrema positions are identified based on the decomposed seismic data (Columns 1, 3).

With regard to claim 6, Sonneland discloses that the orthogonal polynomial spectral decomposition comprises volume reflection spectral decomposition with Chebyshev polynomials used as the basis functions (Columns 1, 3).

With regard to claim 13, Sonneland discloses defining a volume of interest within the seismic data (abstract; Columns 1, 4).

With regard to claim 14, Sonneland discloses that the volume of interest comprises a vertical window of constant thickness or a volume between two pre-determined seismic horizons (Column 4, Line 27 to Column 6, Line 34).

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With regard to claim 15, Sonneland discloses that horizon segments are extracted on opposite sides of input fault surfaces (Column 5, line 48 to Column 6).

With regard to claim 18, Sonneland discloses that the groups of extrema positions are used to create a horizon interpretation (Column 5, Line 45 to Column 6, Line 40).

With regard to claim 19, Sonneland discloses that the groups of extrema positions are used to extract a seismic volume containing multiple reflectors having similar seismic response (Column 5, Line 45 to Column 6, Line 40).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sonneland as applied to claims 1-6, 13-15, and 18-19 above and further in view of Hildenbrand.

With regard to claims 8-11, Sonneland does not disclose that the groups of extrema positions are formed using supervised classification. Sonneland discloses that the coefficients of the extrema values can be used in determining fault locations and other geological features (Column 5, Lines 48-68). Sonneland discloses that sorting rules are given to a computer to identify and isolate the features, and that synthetic

traces can be used to help classify the data (Columns 5-6). Sonneland does not disclose using supervised or unsupervised classification for the positions of the extrema points. Hildenbrand discloses that it is known to use supervised and unsupervised classification in determining horizons and faults (Columns 1-3) using extrema values. It would have been obvious to modify Sonneland to include using either supervised or unsupervised classification with the seed points and number of classes provided by a user as taught by Hildenbrand in order to generate a horizon map of a survey area.

With regard to claim 12, Sonneland Hildenbrand discloses that seed points for the unsupervised classification are selected at random and small spatially contiguous horizon segments are extracted locally around the seed points (Columns 3-6).

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sonneland as applied to claims 1-6, 13-15, and 18-19 above and further in view of Stark.

With regard to claims 16 and 17, Sonneland does not disclose that fault displacement estimates are determined using the extracted horizon estimates or that the fault displacement is broken into throw and heave components. Stark discloses that selected positions can be used in horizon estimates to calculate the throw and heave of a volume (pages 8-11). Sonneland discloses estimating volumes from the selected extrema points, and discloses that these estimates can be used for detecting reflectors, fractures, and other geological features in a survey (Columns 5-6). It would have been obvious to modify Sonneland to include calculating the throw and heave of the detected

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fault locations from the estimated horizons in order to be able to study the movement of hydrocarbons in a formation through fault movement.

### ***Conclusion***

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
SAH

  
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